

# HISTORIC AMERICAN ENGINEERING RECORD

## PEEVY ROAD BRIDGE

HAER NO. PA-616

LCOATION: Peevy Road spanning Perkiomen Creek in Upper Hanover Township, East Greenville vicinity, Montgomery County, PA  
Bin # 46 7046 0400 0231

UTM: East Greenville 18/495450/4432173

DATE OF CONSTRUCTION: 1880

DESIGNER: David H. Morrison

BUILDER: Columbia Bridge Works, Dayton, OH

PRESENT OWNER: Montgomery County, PA

PRESENT USE: Vehicular Bridge

SIGNIFICANCE: The Peevy Road Bridge is an outstanding and exceptionally well-preserved example of a Pratt through truss by the Dayton, Ohio based Columbia Bridge Works. It exemplifies a number of innovations advanced by its key designer, engineer David H. Morrison. Although Morrison is best known for his patented designs for the bowstring truss, his inventive approach to bridge design permeated even the more conventional structures erected by his company. These innovations include extensive early use of I-beams, as well as distinctive "hollow cylinder" verticals and "flat bar" lower chords.

HISTORIAN: Dr. Linda S. Phipps, summer 2002

PROJECT INFORMATION: The Pennsylvania Historic Bridges Recording Project III is part of the Historic American Engineering Record (HAER), a long-range program documenting historically significant engineering, industrial, and maritime sites in the United States. The National Park Service, U.S. Department of the Interior, administers the HAER program. The

Pennsylvania Historic Bridges Project III was co-sponsored during the summer of 2002 by HAER under the general direction of E. Blaine Cliver, Chief; and the Pennsylvania Department of Transportation (PENNDOT), Bureau of Design, Dean A. Schreiber, Director; and the Pennsylvania Historical and Museum Commission, Brent D. Glass, Executive Director and State Historic Preservation Officer. Ms. Kara Russell of the Bureau of Design's Environmental Quality Assurance Division served as principal liaison.

The fieldwork, measured drawings, historical reports and photographs were prepared under the direction of Eric DeLony, Chief of HAER. The team consisted of: Architects—Todd A. Croteau, Project Leader (HAER Architect); Roland S. Flores, Field Supervisor (HAER Architect); Marcy Ann Giannunzio (University of Michigan, Ann Arbor); Katherine Marie Kozarek (University of California, Berkeley); Sara Kryda (Illinois Institute of Technology); Jenna Michelle Murphy (University of Detroit—Mercy); Sandra Christine Pires (ICOMOS—Portugal); Dr. Linda S. Phipps and Dr. Richard Vidutis served as project historians under the supervision of Dr. Richard O'Connor (HAER Senior Historian). Professor Thomas E. Boothby, PhD, PE, RA (Pennsylvania State University, State College) was the Consulting Engineer; Jose C. Colon (Pennsylvania State University, State College), was the Project Engineer. Jet Lowe (HAER Photographer) took all large format photography. Justine Christianson (HAER Historian) prepared the documentation for transmittal to the Library of Congress.

### Description

The Peevy Road Bridge crosses Perkiomen Creek in a rural area just to the northwest of East Greenville in Upper Hanover Township, Montgomery County, Pennsylvania. It is a nine-panel single span Pratt through truss. It measures 103' long with a roadbed width of 15.4' and an underclearance of 10'-10". There is a posted clearance for the overhead struts of 12'-9". The bridge is slightly angled as it crosses the creek.<sup>1</sup> It currently has a 5 ton weight limit posted on the approaches to the bridge. The approaches are of narrowly coursed local stone with concrete coping blocks in two sections, allowing for expansion.

The bridge features decorated portals, with an open arched panel bearing the name of the bridge company. A heraldic cartouche below bears the names of the three county commissioners who commissioned the bridge. Decorative open scroll work in wrought iron ornaments the whole, with panels of open circles filling the portal spandrels. The horizontal strut connecting the two webs at the end panel, like the other struts joining the top chord, is an I-beam, but it is pierced by a decorative pattern of circles. The end posts terminate in decorative blocks bearing the date of erection and decorative metallic appliqué in saw-tooth patterns, dots and scalloped lozenges. Such elaborate ornament, while not exclusive to the Columbia Bridge Works, was typical of its through truss designs.

The bridge is pin-connected throughout its length at the panel points. Angled end posts and the top chord sections are comprised of c-channels bolted to I-beams. At their bases, these end posts have triple flanged projections to facilitate the pin connections of the bridge seat and the lower chord. The bridge is anchored by hinged pin connections at its seat. At their upper ends, the end posts are secured to the top chord by pin connections at a separate compression block. A decorative cap covers the block. With the exception of the angled end panels, which terminate in a slender vertical rod running between the lower and upper chords, distinctive verticals define all of the intermediate panels. These verticals are comprised of channel beams connected by packing blocks that are bolted together. These are more slender while also appearing more substantial than most truss verticals, which are comprised of latticed straps riveted to angles. These verticals carry the lower chord and deck beams. They terminate in the lower cavity of the upper chord, where they are bolted to its outer edges. Diagonal rods reinforce the webs along the panels and are connected by eyelets. The three innermost panels feature single pairs of overlapping diagonals, while the outer pairs of panels have single diagonal bars running from the inner corner of the lower chord to the outer corner of the upper. At their lower ends, they are pin connected to gusset plates that, in turn, are secured at the lower chord pin connections. Each panel is reinforced along its upper surface by slender I-beams secured by strap connections to the upper surfaces of the upper chord and by diagonal bars connected to the upper faces of the diagonals. The lower chord consists of paired wrought iron straps. These straps are borne by a large central pin flanked by three

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<sup>1</sup> See Bridge Inspection Report, August 8, 2000 by Erdman, Anthony, Associates, Inc. District 6-0 PennDOT office, Norristown, PA, in field records for measurements and general assessment of the condition of the structure. The Erdman, Anthony engineer noted a skew of 90 degrees on the orientation of the bridge.

smaller pins. The latter connect the overlapping wrought iron straps and serve as splices. These connections stabilize the lower chord straps while also securing them against lateral stresses.

The transverse deck beams are I-beams, with notches cut into their upper flanges to accommodate the u-shaped hangers by which they are suspended from the central pin connection of the lower chord. These hangers are cylindrical in section and threaded on their lower ends to accommodate nuts, enabling them to carry the flat plates that hold the transverse deck beams in place. These deck beams are penetrated by the diagonal rods running across each panel throughout the length of the truss beneath the deck. The rods are threaded at their ends and connected by nuts after passing through the deck beams. Although these rods are supplied with turnbuckles allowing for tension adjustments, many of them are hanging, slack, and no longer in tension.

The original timber decking has been replaced with steel I-beams welded to the transverse deck beams. These I-beams now support steel grid decking. Modern replacements of the original bridge seat with a reinforced concrete block has encased the ends of the outermost diagonal rods, rendering them unable to perform their intended function of stiffening the corresponding panels against lateral stresses. Similarly, the original wooden hub guards have been replaced with steel guardrails.

The northeastern wing wall bears a marble plaque commemorating the erection of the bridge: "Build [sic] by Montgomery County, A.D. 1880, Amos D. Moser, Noah D. Frank, Jesse B. Davis, Commissioners, H.R. Conrad, Clerk, Presented by Hiram Yeakel & Monroe Snyder." The grist and saw mills located at this site and operated by the donors of the plaque are now evident only in the traces of the millrace to the west of the bridge and the large brick building that was constructed in the late 1890s by a subsequent mill operator.

### Significance

The Peevy Road Bridge recalls traditional patterns of land use in what was, and remains, a predominantly rural area. Upper Hanover Township is located in the northwestern corner of Montgomery County. The population of about 3,000 in 1880 was a mixture of English and German speaking peoples. The Perkiomen Railroad, completed in 1874, had revitalized the area and helped the nearby boroughs of East Greenville, Pennsburg, Palm and Hillegass flourish in the closing decades of the nineteenth century. The agriculturally based economy helped to determine the sorts of businesses that thrived in the boroughs. Local roads and turnpikes traversed the countryside, linking other centers of rural industries such as sawmills, gristmills, tanneries, creameries, and blacksmith shops.

Peevy Road, described in contemporaneous documents as "a public road leading from the Perkiomen Road to Boyerstown near Yeakel's Mill in Upper Hanover Township..." was important because of its role as a key venue for rural industry.<sup>2</sup> The

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<sup>2</sup> See Commissioners' Minutes, Montgomery County, PA for June 11, 1880, Montgomery County Archives, Norristown, PA. See also the petition for appointment of inspectors to assess the workmanship

mills along the Perkiomen Creek on Peevy Road included one of ten gristmills listed on various nineteenth century maps as well as a sawmill. The 1899 gambrel-roofed brick building standing just to the west of the bridge is known as the Comly Mill. Prior mill buildings at the same site were log buildings, each destroyed by fire. It is not known if there were previous bridges at the same site, but given the continuous use of this area for commercial purposes from the 1790s, it would be difficult to imagine that the metal truss structure erected by Columbia Bridge Works was the first.<sup>3</sup> An 1893 map of the Township names Monroe Snyder as the proprietor of the adjacent property, and notes the presence of grist and saw mills at the site of the bridge.<sup>4</sup> Hiram Yeakel and Monroe Snyder donated the marble plaque commemorating the construction of the Peevy Road Bridge in 1880. As the proprietors of the two mills, they would have benefited from the amenity represented by this enhancement of the local transportation network.

The designer of the Peevy Road Bridge, David H. Morrison (1817-1882), founded the Columbia Bridge Works late in a long, successful career as a civil engineer. His training, like that of most men entering his profession during the first half of the nineteenth century, was achieved on the job. After a number of years working on the Miami Canal system in such varied capacities as rod man, surveyor and engineer, Morrison left for the newly created position of City Engineer for the City of Dayton, Ohio. During his tenure there, he often had to coordinate improvements to the urban infrastructure with the railroads that continued to expand their lines into the city. Some of these improvements included bridge design. After 1852, he began working as a consultant for the Montgomery County (Ohio) commissioners, where he helped draft plans and specifications to assist in bridge lettings. His designs included stone arch as well as wooden and metal truss structures. David A. Simmons, who has published the most comprehensive scholarship on Morrison to date, cites several examples of bridges of various types designed by Morrison for the city and county in the 1840s and 50s.<sup>5</sup> Morrison's innovative work with I-beams after the Civil War included designs for a bowstring truss that employed bent I-beams for its main compressive arch members. He patented this design in 1867.

The Peevy Road Bridge is a particularly well-preserved example of a Columbia Bridge Works Pratt through truss. It evinces a number of novel adaptations of traditional members and connections by Morrison. These include the extensive use of I-beams, most notably in the transverse deck beams. Although I-beams were standard structural members from the time of the Civil War, few bridge builders employed them at this time, relying instead upon rectangular or triangular composite beams. Morrison's verticals also vary from the norm in that they are comprised of channel beams linked by packing blocks, thus creating supports much like hollow cylinders. More conventional bridges of the same era used lattice straps riveted to angles for this element. Another innovation

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of the newly completed bridge on Peevy Road, submitted to the Court of Quarter Sessions, Nov. 22, 1880, Montgomery County, PA, Bridge Docket, Montgomery County Archives, Norristown, PA.

<sup>3</sup> See Jean Barthtoll and Michael J. Schwager, Montgomery County: The Second Hundred Years (vol. 1 of 2), (Norristown, PA: 1993), p. 692.

<sup>4</sup> Upper Hanover Township in Property Atlas of Montgomery County, PA (Philadelphia: 1893).

<sup>5</sup> David A. Simmons, "Dayton's Premier Bridge Builder: David H. Morrison, Civil Engineer," in Miami Valley History: A Journal of the Montgomery Historical Society, Vol. III (1991), see especially pp. 23-28.

also deployed in this bridge is Morrison's trademark "Flat Bar Chords." In place of the nearly standard paired eyebars, Morrison used parallel sets of flat lap-jointed bars as a means of stabilizing and stiffening the truss through the lower chord. As David A. Simmons explains, Morrison argued that the additional strength added to the bridge through this invention far offset the additional weight added to the dead load.<sup>6</sup>

By the time of the Peevy Road commission, Morrison's son, Charles C., had also been involved with the company for over a decade.<sup>7</sup> Their prosperous business had erected bridges throughout most of the United States. David Morrison's entrepreneurial skills are further evident in his dealings with the Montgomery County commissioners in Pennsylvania. During 1880, the commissioners resolved to build four bridges, one masonry and three wrought iron truss bridges. Bid proposals were solicited and opened on August 7, 1880.<sup>8</sup> For each of the three bridges, Morrison was the low bidder at \$22.49 per lineal foot, or \$21.69 with wooden hub guards, among competitors that included the Denithorne Brothers, Phoenixville; L. Sykes & Son, Philadelphia; and the Wrought Iron Bridge Company of Canton, OH, among others. One assumes that Morrison, or, more likely, his local sales representative, was able to offer such low prices based on the principle of volume discounts. It proved a successful sales strategy, since Columbia Bridge Works obtained commissions for three bridges. John Murphy, a local mason, executed the masonry abutments under a separate contract. The commissioners also specified the color of paint for the superstructure, "Ohio Brown."<sup>9</sup> One wonders if this selection was intended to recall wood or to blend in with the surroundings. Presently the bridge, like many other metal truss bridges in the Commonwealth of Pennsylvania, is painted light green. The bridge was successfully inspected and the contract deemed completed on December 1, 1880.<sup>10</sup>

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<sup>6</sup> Simmons, pp. 18-30. The author is indebted to Mr. Simmons for sharing his expertise and for providing copies of his scholarship on short notice for this report.

<sup>7</sup> Charles joined the company in 1868. At David's death in 1882, his sons inherited the business. Simmons, p. 29.

<sup>8</sup> See Commissioners' Minutes, Montgomery County, PA for August 7, 1880, Montgomery County Archives, Norristown, PA. The masonry abutments and wing walls were let under a separate contract to a local mason, John Murphy, see minutes for August 27.

<sup>9</sup> See Commissioners' Minutes, September 27, 1880.

<sup>10</sup> Bridge Docket, Dec. 1, 1880, filed Dec. 16, 1880. Court of Quarter Sessions. Montgomery County Archives, Norristown, PA.

Sources Consulted:

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